1908MNRAS..68..662S

SUMMARY.

The sun-spot maxima (and minima) occur on the average at intervals of 11·125 years. But the individual maxima (and minima) show discordances which have been tabulated for 26 periods by Wolfer. Analysing these by the periodogram method of Professor Schuster, there are indications of two periodicities, one of which the phase advances 53° per period of $11\frac{1}{8}$ years, the other of which the phase advances only 20°. The cycles are completed in about 75 and 200 years respectively. The amplitude of each inequality is about a year, but the accidental errors are so large that either or both of these inequalities may be spurious.

The quicker moving inequality (53°) can be brought into line with similar inequalities for the long-period variables; the best formula connecting A (advance of phase in degrees per period) with P (the period in days) being the simple linear formula

$$A = 4^\circ{\cdot}4 + 0^\circ{\cdot}012\ P.$$

The slower moving inequality (20°) may quite possibly have analogies in the stars, but as yet the material is not sufficient to declare.

Researches on the Solar Constant and the Temperature of the Sun. By Dr. J. Scheiner, Assoc. R.A.S.

In No. 55 of the Publications of the Astrophysical Observatory, Potsdam, I have published an extended paper on this subject, and I should like to give a short report of the results to the readers of the *Monthly Notices.*

The measures of the Sun's radiation were made with the Ångström Electric Compensation Pyrheliometer, to which I had given a modified exterior form and a parallactic motion with clockwork. On eleven days in June and July 1903 I made a long series of observations on the top of the Gorner Grat in Canton Wallis (Switzerland), from which I could derive the radiation of the Sun outside our atmosphere. This part of the problem is the most difficult one, and, according to my view, it cannot be solved from measurements of the solar radiation alone. From such observations a portion only of the real solar constant can be obtained, because only that portion of the loss by absorption in our atmosphere can be calculated which is based upon the *continuous* increase of absorption with growing thickness of the atmospheric layer traversed by the radiation. With carbon dioxide and water vapour there exists a nearly sudden absorption in the highest thin layers of the atmosphere, which must be treated as a constant to be added to the

1908MNRAS..68..662S

result from the radiation-curves. Therefore this latter result is not the solar constant as generally supposed, and I have chosen for it the term "Strahlungsconstante" or "Constant of Radiation." From my observations on the Gorner Grat it amounts to 1·95–2·02 gr. cal. The remaining constant, which must be added to it for obtaining the Solar Constant, can be found only from experimental researches in the laboratory. To this part of the problem I have devoted much labour in measuring the absorption of carbon dioxide and superheated water vapour with varying depth of layer.

This very complicated research cannot be described in a short abstract, and I must therefore refer to the original paper. The result is that for reducing the Radiation Constant to the Solar Constant there must be added for carbon dioxide 1%, for water vapour 7%, and for the ultra violet absorption 1½%, whence the Solar Constant for the unit of distance is found to be 2·22–2·29 gr. cal., with a probable error of 2%.

The constant of the Stefan law, which is necessary for calculating the effective temperature of the Sun from the Solar Constant, I have ascertained by different methods, and with the same pyrheliometer, thus eliminating the constant error of the apparatus which cannot exceed 1 per cent. The "black radiation" of known temperature was measured from black platinum, rendered incandescent by an electric current, from light flames of different thicknesses, and from the artificial "black body." The latter results were the most exact and the effective temperature of the Sun based upon them was found to be 6196°–6252°.

Further on, I have endeavoured to calculate the real temperature of the solar photosphere from the effective temperature by employing the known data on the absorption of the solar atmosphere. Of course this research cannot be of the same exactness as the foregoing one, especially because the photosphere has no definite temperature, consisting as it does of layers of very different temperature.

Neglecting the errors arising from our ignorance of the structure of the photosphere, its average temperature comes out as 7065°.

1908MNRAS..68..662S

The Total Solar Eclipse of 1910 *May* 8.

By A. M. W. Downing, D.Sc., F.R.S.

This eclipse is observable in Tasmania, though not under very favourable conditions, owing to the Sun's low altitude at the time of totality.

The particulars for Hobart are given on page 444 of the *Nautical Almanac* for 1910. It will be noticed that the Sun sets before the ending of the partial phase of the eclipse.

Port Davey, in the south-west of Tasmania, is, however, a more favourable station from which to observe the total phase of this eclipse, the duration of totality there being half a minute longer than the duration at Hobart. Some particulars of the eclipse as seen from Port Davey are given, as an example of eclipse calculations, on page 590 of the *Nautical Almanac* for 1910. For the convenience of observers these are reproduced here, and some additional particulars added.

Port Davey. Long. 146° 0′ *E. Lat.* 43° 22′ *S.*

Standard Mean Time (10^h *East*).

		d	h	m	s	Angle from North Point.	Vertex.
First contact	May	9	3	4	2	247°	99°
Total Eclipse		9	4	11	55	52	272
		9	4	15	25	267	127
Sun sets		9	5	8			

With the existing errors of the lunar tables, the predicted times for the phases of the eclipse given above will be several seconds too late. It may be useful, therefore, to add the intervals in time from the instant when the cusps subtend a given angle at the Sun's centre to the commencement of totality.

Angle of Cusps.	Time before commencement of totality.
°	s
90	42
60	16
45	9
30	4
15	1

The Sun's altitude at the time of totality is 8°.